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K. S. Hsu

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Abstract

A modifier of the morphological mutant scumbo in *Neurospora crassa*

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The morphological mutant sc (scumbo 5801) was incorporated into the linkage-testers LT1A and LT2a as a centromere marker for linkage group III (Perkins 1959, Genetics). In crosses made for linkage detection where either one of the testers was used as one of the parents, two different phenotypes of sc could be recognized in the progeny. One type grew more vigorously, and was closer to, but easily distinguishable from, the wild-type phenotype. The other gave more restricted growth, which resembled the phenotypic expression of the tester. There was no difficulty in classifying these two types on solid medium, especially if scoring was early. The presence or absence of a modifier linked to the gene pan-1 (5531) in group IV seemed to be responsible for the dual expressions of sc, as indicated in Table 1.

Table 1. Data Indicating the Linkage of a sc modifier with pan-1 (3 crosses pooled)

Scumbo Phenotypes	pan^+	pan^-	Total
sc^+	74	69	143
vigorous sc	66	15	81
restricted sc	11	60	71

Isolates from one such cross representing both sc phenotypes were crossed with the wild-type strains STA4 and Pa. While a ratio of 1 wild-type to 1 vigorous scumbo was observed in the progeny when vigorous scumbo was the sc parent, a 2:1:1 segregation for the wild type, the vigorous scumbo, and the restricted scumbo appeared in F_1 when the sc parent was restricted scumbo. The symbols sc and sc; mod-sc are therefore designated as the genotypes of vigorous scumbo vs restricted scumbo, where mod-sc symbolizes the modifier.

mod-sc is manifested only when sc is also present in the genome. In the presence of sc^+, mod-sc strains can not be distinguished phenotypically from the strains carrying no mod-sc. For the isolation of sc^+; mod-sc strains, STA4 was crossed by a strain carrying sc; mod-sc, pan and the scumbo isolates of both phenotypes from the cross were further crossed with several sc^+; pan isolates from the same cross. Any sc^+; pan isolates also carrying mod-sc would be expected to produce three types of tetrads in the progeny when they were crossed with sc: (1) Two of the four meiotic products are vigorous scumbo (+ + sc sc); (2) two products are restricted scumbo (+ + sc^r sc^r); and (3) one product is vigorous, and one, restricted (+ + sc sc^r), and only + + sc^r sc^r type of tetrads when crossed with sc; mod-sc. On the other hand, any sc^+; pan isolates without mod-sc would give the three types of tetrads only when they were crossed with sc; mod-sc, and only + + sc sc type of tetrads when crossed with sc. The data obtained by analyzing unordered tetrads in the identification of the sc^+; mod-sc strains are listed in Table 2. It was clear that two of the three sc^+; pan- isolates tested contain the modifier mod-sc.

Table 2. Crosses Identifying sc^+; mod-sc Strains

Cross	No. and Percentage Analysable Tetrads	Type of Tetrad		
		+ + sc^r sc^r	+ + sc sc	+ + sc sc^r
1. STA4 x sc^r	47 (69%)	15	12	20
2. STA4 x sc	21 (70%)	0	21	0
3. sc^+; pan isolate 1 x sc^r	33 (80%)	11	10	12
4. sc^+; pan isolate 1 x sc	50 (77%)	0	50	0
5. sc^+; pan isolate 2 x sc^r	19 (76%)	19	0	0
6. sc^+; pan isolate 2 x sc	39 (78%)	7	10	22
7. sc^+; pan isolate 3 x sc^r	18 (72%)	18	0	0
8. sc^+; pan isolate 3 x sc	41 (89%)	13	13	15

The effect of mod-sc appears to be specific on sc insofar as it does not affect four other morphologicals tested: cr (cr^{L}, Bl23), fr (Bl10), bis (B6) and sp (Bl32). --Department of Biological Sciences, Stanford University, Stanford, California.